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10/687,699	10/20/2003	Young-hoon Jeong	Q77117	2834

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EXAMINER	
LEE, TOMMY D	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/687,699	JEONG, YOUNG-HOON	
	Examiner	Art Unit	
	Thomas D. Lee	2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 September 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response

1. This Office action is responsive to Applicant's RESPONSE UNDER 37 C.F.R. § 1.111, filed September 26, 2007. Claims 1-23 are pending.

Response to Arguments

2. Applicant's arguments filed in response to the rejections of claims 1-3, 9-13, 19-21 and 23 under 35 U.S.C. 102(b), and claims 4-8, 14-18 and 22 under 35 U.S.C. 103(a), as set forth in the prior Office action mailed June 26, 2007, have been fully considered but they are not persuasive.

3. Regarding claims 1-3, 12 and 13, Applicant asserts that the cited prior art (U.S. Patent 5,822,451 (Spaulding et al., hereinafter Spaulding)) does not describe receiving a "stored mask threshold value" for "one color channel," and generating "a respective mask threshold value for each of a plurality of color channels." (current amendment, page 2). Specifically, Applicant states that Spaulding shows components which take coordinate values for a dither matrix for one color channel, and generate a threshold value for one color, whereas the current invention receives a single input and generates threshold values for each of red, blue and green colors." (current amendment, page 3). In other words, Applicant states that the current invention generates threshold values for all colors from an input value for one color, while Spaulding only generates a single threshold value corresponding to the input value for one color. However, Applicant's claim 1 does not clearly necessitate that threshold values for all colors are generated from an input value for one color. Applicant's mask generator, as recited in the claim,

"receives a respective stored mask threshold value corresponding to the address from the mask memory and generates a respective mask threshold value for each of a plurality of color channels." This recitation is broad enough to be interpreted as reciting generation of a mask threshold from a respective stored mask threshold value, and this generation is performed for each of the color channels, which is taught by Spaulding.

4. Regarding claims 9-11, 19-21 and 23, Applicant asserts that the cited prior art (U.S. Patent 5,768,411 (Shu et al., hereinafter Shu)) fails to discuss any "predetermined algorithm" for generating mask information for one color channel (current amendment, page 3). However, Shu discloses that the method may be stored as a computer program in a diskette or CD-ROM for performing the steps of Shu's invention (column 3, line 59 - column 4, line 2). The computer program is the predetermined algorithm for performing all of the method steps, including generating the mask information.

5. Applicant further states that Shu does not describe "an offset calculator" for calculating a predetermined offset (current amendment, page 4). However, Shu clearly states: "For instance, FIG. 5 depicts the result of generating the yellow matrix by simply *adding half the color-component range to corresponding values of the cyan matrix.* Indeed, the magenta and yellow matrices can both be generated in a similar fashion from the cyan matrix, as can be seen in FIG. 6, which depicts the results of generating elements of the magenta and yellow matrices by *adding one-third and two-thirds, respectively, of the pixel-component-value range to corresponding elements of the cyan matrix.*" (column 5, lines 38-47, emphasis added). Adding a portion of the color-component range implies the presence of a calculator for performing the addition, with

predetermined offsets indicated by half, one-third and two-thirds of the color-component-value range. Additionally, Applicant states that any matrices based on the cyan matrix apparently "may be completely pre-calculated," and thus Shu would not contain any component corresponding to a mask calculator (current amendment, page 4). This is purely speculative. Shu *does not* state that the matrices are pre-calculated, nor it is stated that a mask calculator would not be used. Shu *does* state that portions of the pixel-component-value range are added to generate matrices.

6. Regarding claims 4-8, 14-18 and 22, Applicant states these claims are patentable for reasons analogous to those presented with respect to claims 1 and 12, as Examiner's arguments and other cited prior art fail to make up for the deficiencies of Spaulding and Shu (current amendment, pages 5 and 6). Applicant further states that the current invention generates "mask threshold value[s] for each of a plurality of color channels" from "the mask memory" rather than from multiple separate dither matrices in separate storage, as taught by Spaulding (current amendment, page 6). These arguments have been addresses above.

Claim Rejections - 35 USC § 102

7. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

8. Claims 1-3, 12 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Spaulding.

Regarding claims 1-3, Spaulding discloses an apparatus for halftoning a color image comprising: an address generator that receives a pixel in an image intended for

halftoning and generates an address corresponding to a position of the pixel in a mask memory storing mask threshold values for one color channel (column 4, lines 7-16); a mask generator that receives a respective stored mask threshold value corresponding to the address from the mask memory and generates a respective mask threshold value for each of a plurality of color channels (column 4, lines 16-22); and a comparison unit that sequentially receives the respective mask threshold value generated for each of the plurality of color channels and a pixel value in the image intended for halftoning, compares both values with each other, and outputs a bilevel value according to a predetermined rule (column 4, lines 22-30). The address generator comprises: a pixel position information storage unit that receives the pixel in the image intended for halftoning and stores the position of the pixel (multi-channel input color images 40A, 40B, 40C generate image column and row addresses x and y); a mask memory that stores mask threshold values for each color channel generated according to a predetermined algorithm (optimized dither matrices 44A, 44B, 44C); and a mask address generator that sequentially receives information on the pixel position from the pixel position information storage unit and generates the address corresponding to the position in the mask memory, the pixel position information storage unit comprising an X-direction counter that counts X-coordinates of pixels, and a Y-direction counter that counts Y-coordinates of pixels (modulo operators 42A, 42B, 42C convert column and row addresses from multi-channel input images to dither matrix column and row addresses x_d and y_d).

Regarding claims 12 and 13, Spaulding discloses a method for halftoning a color image comprising the steps of: (a) receiving a pixel in an image intended for halftoning and generating as address corresponding to a position of the pixel in a mask memory storing mask threshold values for one color channel (column 4, lines 7-16); (b) receiving a respective stored mask threshold value corresponding to the address from the mask memory and generating a respective mask threshold value for each of a plurality of color channels (column 4, lines 16-22); and (c) sequentially receiving the respective mask threshold value generated for each of the plurality of color channels and a pixel value in the image intended for halftoning, comparing both values with each other, and outputting a bilevel value according to a predetermined rule (column 4, lines 22-30). The step (a) comprises the steps of: (a1) storing in advance the respective stored mask threshold value for one color channel generated according to a predetermined algorithm (optimized dither matrices 44A, 44B, 44C); (a2) receiving the pixel in the image intended for halftoning and storing the position of the pixel (multi-channel input color images 40A, 40B, 40C generate image column and row addresses x and y); and (a3) sequentially receiving information on the pixel position stored in the step (a2) and generating the address of the respective stored mask threshold value in the mask memory corresponding to the position (modulo operators 42A, 42B, 42C convert column and row addresses from multi-channel input images to dither matrix column and row addresses x_d and y_d).

9. Claims 9-11, 19-21 and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Shu.

Regarding claims 9-11, Shu discloses an apparatus for generating a mask during halftoning comprising: a mask information input unit that receives mask information for one color channel generated by a predetermined algorithm (reference dither matrix (cyan) shown in Fig. 3A); an offset calculator that calculates a predetermined offset (fractions of pixel component value range determined (column 5, lines 33-47)); and a mask calculator that calculates masks for a plurality of channels using information on the predetermined offset calculated by the offset calculator (magenta and yellow matrices generated by adding fractions of pixel component range to corresponding values of cyan matrix (column 5, lines 33-47)). The offset calculator calculates the predetermined offset by dividing a largest pixel value in an image intended for halftoning by a number of colors used for halftoning (magenta and yellow matrices generated by adding one-third and two thirds of the pixel component value range to corresponding elements of the cyan matrix (column 5, lines 41-47)). In order to generate the masks for the plurality of channels, the mask calculator receives a mask threshold value from the mask information input unit, adds the predetermined offset calculated by the offset calculator to the mask threshold value, and if a result value is greater than a largest pixel value, calculates a respective mask threshold value by subtracting the largest pixel value from the resulting value (noting Fig. 6, when the yellow threshold or the magenta threshold reaches a value corresponding to the pixel component value range, the threshold returns to zero).

Regarding claims 19-21 and 23, Shu discloses a method for generating mask during halftoning, and a computer-readable recording medium that records a program

for executing a color image halftoning method on a computer (column 3, line 59 – column 4, line 2), the method comprising the steps of: (a) receiving mask information for one color channel generated by a predetermined algorithm (reference dither matrix (cyan) shown in Fig. 3A); (b) calculating a predetermined offset (fractions of pixel component value range determined (column 5, lines 33-47)); and (c) calculating masks for a plurality of channels using information on the predetermined offset calculated in the step (b) (magenta and yellow matrices generated by adding fractions of pixel component range to corresponding values of cyan matrix (column 5, lines 33-47)). In the step (b), the predetermined offset is calculated by dividing a largest pixel value in an image intended for halftoning by a number of colors used for the halftoning process (magenta and yellow matrices generated by adding one-third and two thirds of the pixel component value range to corresponding elements of the cyan matrix (column 5, lines 41-47)). In the step (c), masks are generated for the plurality of channels by receiving threshold values stored in a mask memory, adding the predetermined offset to each threshold value, and if a resulting value is greater than a largest pixel value, calculating a respective threshold value after subtracting the largest pixel value from the resulting value (noting Fig. 6, when the yellow threshold or the magenta threshold reaches a value corresponding to the pixel component value range, the threshold returns to zero).

Claim Rejections - 35 USC § 103

10. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

11. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Spaulding.

Claim 22 recites the limitations of above-rejected claim 12, recorded on a computer-readable recording medium. While a computer-readable recording medium is not expressly disclosed in Spaulding, it is well known in the art to provide either an internal ROM or an external storage device, such as a CD-ROM, for providing instructions to a CPU, and such means are necessary for enabling the CPU to perform image processing. It would have been obvious for one of ordinary skill in the art to provide a storage device for storing program instructions in Spaulding, thereby enabling the CPU to perform the halftoning operation.

12. Claims 4, 5, 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Spaulding as applied to claims 2 and 12 above, and further in view of U.S. Patent 6,154,195 (Young et al., hereinafter Young).

Regarding claims 4, 5, 14 and 15, Spaulding does not expressly disclose the use of an 8x8 Bayer Dither Table. Young discloses a method for performing dithering, using an arrangement similar to that of Spaulding (Fig. 5), and employing a Bayer dither matrix for halftoning image data (column 7, lines 53-67). It would have been obvious for one of ordinary skill in the art to modify the teaching of Spaulding by using a Bayer dither matrix, as disclosed in Young, so as to reduce banding artifacts to get smoother transitions between color gradients (column 7, lines 53-57). Young shows a 4x4 matrix (Fig. 4), but one of ordinary skill in the art would have recognized the size of the dither matrix used for halftoning image as a matter of design choice.

13. Claims 6-8 and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Spaulding as applied to claims 1 and 12 above, and further in view of Shu.

Claims 6-8 and 16-18 recite the limitations of above-rejected claims 9-11 and 19-21. These limitations, while not disclosed in Spaulding, is taught by Shu, as set forth above. Applying the dithering method of Shu to the teaching of Spaulding assures that dots of the different colors do not coincide with each other in light-colored regions, thereby providing a smoother appearance (Shu: column 4, line 60 – column 5, line 2; column 5, lines 33-47), and thus one of ordinary skill in the art would have been motivated to combine the teachings of Spaulding and Shu, by providing dither matrices such as taught by Shu in the teaching of Spaulding.

Conclusion

14. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas D. Lee whose telephone number is (571) 272-7436. The examiner can normally be reached on Monday-Friday, 7:30-5:00, alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward L. Coles can be reached on (571) 272-7402. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Thomas D Lee
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tdl
December 5, 2007